# Solvent Update, Labs-01

# Solvent Loss Break-Up (Apr'25 till Feb'26)

| | Existing | Proposed | |
|---|---|---|---|
| **Labs-I in** | **31,399** | | **KL** |
| Fresh solvent | **20,700** | **17,583** | |
| RFS From In-House SRS & Vendors (Job work) | **9,525** | **12,406** | |
| In-process distilled re-use | **1,179** | **1,410** | |
| | | | |
| **Labs-I out** | **19,833** | **22,391** | **KL** |
| Spent sent to Job work | 5,881 | 7,500 | |
| Spent sales | 5,028 | 4,000 | |
| Sent to SRS for RFS (Inc. Other Units.., Zen & LS3) | 8,891 | 10,891 | |
| **Plant in - Plant out(Gap in KL)** | **11,566** | **9,008** | |
| **% of gap** | **36%** | **29%** | |
| **Spent sent to SRS (In-house..., Labs-01)** | | 6,889 | |
| **RFS From SRS (Labs-01)** | | 4,651 | |
| | | | |
| **SRS In - SRS out(Gap in tons)** | | 2,238 | |
| **% of gap** | | **32%** | |

**Note:** Out of 11,566 KL ~75% is process loss & 25 % is SRS loss

**Process loss:**--- Major is Methanol & Acetone which is going along with Aq. streams (into ETP)

# Top Solvent Consumptions data

**Total Solvent Used (KL): -- 31,399**

**Note:** Below 06 Solvents contribute about 93% by volume

| Solvent | Total Qty (KL) | Existing | | | | Proposed | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Fresh (KL) | Recovery (KL) | Fresh% | Recovery % | Fresh (KL) | Recovery (KL) | Fresh% | Recovery % |
| **Ethyl Acetate** | 10,037 | 4,447 | 5,590 | 44.30% | 55.70% | 4,447 | 5,590 | 44.3% | 55.7% |
| **Methanol** | 5,469 | 5,148 | 321 | 94.12% | 5.88% | 3,469 | 2,000 | 63.4% | 36.6% |
| **Acetone** | 5,393 | 3,746 | 1,647 | 69.46% | 30.54% | 3,446 | 2,200 | 59.2% | 40.8% |
| **DCM** | 3,904 | 2,898 | 1,006 | 74.23% | 25.77% | 1,904 | 2,000 | 48.8% | 52.2% |
| **Toluene** | 2,822 | 1,193 | 1,629 | 42.28% | 57.72% | 1,193 | 1,629 | 42.3% | 57.8% |
| **IPA** | 1,607 | 1,413 | 194 | 87.92% | 12.08% | 957 | 650 | 59.6% | 40.4% |
| **Total** | **29,232** | **18,845** | **10,387** | **64.45%** | **35.55%** | **15,416** | **13,816** | **52.74%** | **47.26%** |

# PHASE-02 CAPEX 23.0 Cr. (Permenent Set-up for Aq streams)

- 05 Reactor --- 20 KL SSR (02 No’s), 15 KL SSR (01 No’s) & 15 KL MSGL (02 No’s)

**Note:** 02 No’s with Thermosyphone re-boiler along with packed column (in vapour line with 10 M packing height)

- PSA (pressure swing adsorption), Column packing & accessories
- Civil & Structure for 04 Recator slot
- Pipes & fitting, service equipments(Electrical, Utility & process lines, Cooling tower, Vacuum systems...,)
- Spent segeration Methanol & Acetone (cleaning solvents).
- Modifications related to -50°C brine system usage (inplace of dry ice), Vent condenser.
- Implementation of CIP system for 02 blocks as PoC to reduce the cleaning solvent consumption.
- Vacuum controllers, utility flow measuring instruments, vent condenser for catch pot..., to avoid vapour loss.

**Note:**

- **Permenent set-up (with Pre & post treatment, PSA & 10 Mts. column packing’s) ---- 12.5 Cr.**
- **Solvent loss minimization ---- 7.5 Cr**
- **Utility automation for methanol loss reduction (avoid mix-up) ---3.0 Cr (Only CHB with ON/OFF& flow switch).**

# ROI on CAPEX of 20 Cr. below 1.5 Years

- Current fresh consumption @ Labs-01 ---- 1885 KL/month (Total); **1710 KL form top 06 solvents**
- Avg. fresh solvent cost --- 11.o Cr/month
- Cost per KL:--- 0.0058 Cr/KL

- **Improvement**
- **Reduction in fresh consumption: ~310 KL/month**
- **Reduction in cost:--- ~1.6 Cr/month**
- **Considering OPEX @20% of improvement :-- 0.35 Cr.**
- **Net saving will be ~ 1.2 Cr.**

✓ **RoI:**

✓ **Capex: 20 Cr.**

✓ **Saving: 1.2 Cr./month**

✓ **RoI will be ~16 months (Below 1.5 Years)**

# Methanol Consumption & Action plan with Capex:

Total Input:--- ~500 KL/Month

- Process:--- 250 to 280 KL
- Cleaning:--- 100 to 120 KL
- Chilling plant:--- 50 to 70 KL
- Dry Ice:--- 20 KL

**Note:**

- ~50 KL will be process loss as missiability along with water.
- ~80 KL loss from chilling plant.
- ~60 KL as spent mixed.

- Considering all the above net recovered solvent will be ~270 to 300 KL.
- Considering 60% as reusable quantity.
- Net Methanol re-used:--- 160 to 170 KL/Month
- ~1900 to 2000 KL/Year as re-usable solvent

- Major Product's: Rosuva, Dapa & Ezeta..,

**Costing: Total of 3.65 Cr**

**Sageration of Cleaning MeoH from Spent: 2.15 Cr. (@15 blocks)**

- **Facility creation @ blocks: 0.95 Cr**.
  - SS-304 Receiver: 0.5 KL/Block (@ 1.5 L each inc. fittings)
  - Pump: 10 m3/hr @ 40 M Head @ 3.0 L each
  - Electrical @ 0.5 L each
  - Mobile receiver 50 Lts @ 1.0 L/block
- **Pumping lines: 1.2 Cr.** (Inc., piping, fittings & fabrication)

**Note:** RoI will be 2.0 Years (~50% re-usable aganist input-- 100 KL).

**Using -50 Utility: 0.7 Cr. Modif. cost** (inc. piping, fitting & insulation)

- OPEX of -50°C chiller:-- Rs: 32.6/TR.
- Considering 08 hrs run time OPEX : 1.0 L/Month.
- Cost of Methanol: 1.0 L/Month (@ 10 Rs/L as we are using distilled).
- Dry ice cost: 3.6 L/Month

**Note:** ~ 2.5 L will be a direct saving (after consuming ~10 KL methanol).

# Acetone Consumption & Action plan with Capex:

Total Input:--- ~500 KL/Month

- Process:--- 400 to 440 KL
- Cleaning:--- 60 to 90 KL

**Note:**

- ~35 to 45 KL/Month will be directly re-used as in-process distillate.
- ~200 KL will be sent to job work (purity 85 to 90%) with remaning of DCM.
- ~200 KL will be sent to job work with 35% EA.
- ~200 KL will be sell as spent mixed (~50% water).
- Spent sale (cleaning solvent ~60 KL)

**Issues:**

Majorly Acetone goes as mixture of DCM & EA which is impaciting on the % recovery.

- Major Product's: Panto, Dabi, & Olme..,

**Costing: Total of 2.15 Cr**

**Sageration of Cleaning Acetone from Spent: 2.15 Cr. (@15 blocks)**

- **Facility creation @ blocks: 0.95 Cr**.
  - SS-304 Receiver: 0.5 KL/Block (@ 1.8L each inc. fittings)
  - Pump: 10 m3/hr @ 40 M Head @ 3.0 L each
  - Electrical @ 0.5 L each
  - SS Mobile receiver @ 1.0 L each.
- **Pumping lines: 1.2 Cr.** (Inc., piping, fittings & fabrication)

**Note:** RoI will be 1.0 Years (~50% re-usable aganist input-- 60 KL).

- **CIP Nozzle:**
  - Based on the CIP nozzle efficiency for methanol further working's will be done for Acetone & other block's

## IPA Consumption:

Total Input:--- ~145 KL/Month

- Almost full quantity used for process

**Note:**

- ~90 to 100 KL is recovered from the input (65%).
  - ~95 KL/Month is going for Job work **(~20% M.C & 95% purity)**.
  - ~10 KL is going as IPA spent.
  - ~15 - 20 KL is further going with Aq. stream after IPA distillation.
- ~10 - 15 KL is goining as mixed spent (IPA+THF+EtoH & E>A).
- ~5.0 to 10.0 KL is going as along with Aq. streams (Un-able to flash due to colour issues).

**Action plan:**

**A) De-hydration of IPA before sending to job work.**
**B) Flashing of coloured Aq.IPA streams.**

## MDC Consumption:

Total Input:--- ~350 KL/Month

- Almost full quantity used for process

**Note:**

- ~170 to 180 KL is recovered from the input (50%).
  - ~155 KL/Month is going for Job work **(85% purity)**.
  - ~20 KL is going along with Acetone.
- ~50% is process loss

**Action plan: Capex @ 1.5 Cr.**

**A) Vacuum controller---- 2.0 L X 10 No's = 20 L.**
**B) Vent condenser for CF catch pot's --- 6.0 L X 10 No's = 60 L.**
**C) Extractions or back wash using pump's 50 L (02 No's/ block)**
**D) Stream line of vacuum balance lines.**
**E) Usage of pumps for catch pots rather using vacuum.**

# Toluene Consumption:

Total Input:--- ~250 KL/Month

- Almost full quantity used for process

**Note:**

- ~85 to 90% (~225 KL) is recovered from the input.
- ~15 to 20 KL/Month will be directly re-used as in-process distillate.
- ~200 KL will be sent to SRS for recovery.
- ~80% will be recovered (inclu. fractions ~6 to 10%).
- ~120 KL will be used at unit-01.
- ~ 60 KL will be sent to other unite (which is not covered in above table).

**Net 80% is recovered as re-usable solvent.**

## April'25 to Feb'26 SOLVENT CONSUMPTION & PROCESS OUTPUT DETAILS(KL)

| | | Process Input | | | | Process Output | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Description | Density | Fresh solvent Consumption | RFS Consumption | Reactor distilled Solvent Consumption (Direct Reuse) | Total Process IN | Direct reusable recovery distilled Solvent (Direct Reuse) | ML's/Organic layers/ Mixed solvents/To be distilled | Spent solvent for disposal | Total process Output | Percentage of recovery | Inside SRS (MSN) in KL | Outside SRS(Vendor) in KL |
| Methanol | 0.792 | 5,148 | 129 | 193 | 5,469 | 193 | 858 | - | 1,051 | 19% | 328 | - |
| Toluene | 0.862 | 1,193 | 1,476 | 153 | 2,822 | 153 | 1,535 | - | 1,688 | 60% | 2,185 | 230 |
| Acetone | 0.785 | 3,746 | 1,285 | 362 | 5,393 | 362 | 888 | - | 1,251 | 23% | 336 | 829 |
| ISOPROPYL ALCOHOL (IPA) | 0.786 | 1,413 | 194 | - | 1,607 | - | 680 | - | 680 | 42% | 26 | 946 |
| Methylene Chloride | 1.326 | 2,898 | 888 | 119 | 3,904 | 119 | 1,217 | - | 1,335 | 34% | 539 | 917 |
| Ethyl Acetate | 0.902 | 4,447 | 5,252 | 339 | 10,037 | 339 | 4,505 | - | 4,844 | 48% | 4,580 | 2,666 |
| Di Methyl Formamide | 0.948 | 144 | 11 | - | 154 | - | - | - | - | 0% | - | - |
| Tetra Hydro Furan | 0.888 | 466 | 152 | - | 618 | - | 139 | - | 139 | 22% | 21 | 124 |
| N-Heptane | 0.680 | 139 | - | - | 139 | - | 56 | 77 | 133 | 95% | - | - |
| Methyl Tertiary Butyl Ether | 0.740 | 310 | 12 | - | 323 | - | 167 | 166 | 333 | 103% | - | - |
| Cyclo Hexane | 0.774 | 290 | 96 | 14 | 400 | 14 | 225 | 24 | 263 | 66% | 308 | - |
| Iso Propyl Acetate | 0.870 | 107 | - | - | 107 | - | - | 117 | 117 | 109% | - | - |
| Distilled Mixed Solvent | 0.870 | | | | 0 | - | - | 2,911 | 2,911 | | - | - |
| Mixed CFML's Solvents | 0.800 | | | | 0 | - | 3,343 | 700 | 4,043 | | | - |
| Acetone+EA | 0.840 | | | | 0 | - | - | - | - | | 502 | - |
| Acetone+Water | 0.800 | | | | 0 | - | - | 849 | 849 | | | |
| Total | | 20,700 | 9,521 | 1,179 | 31,399 | 1,179 | 13,626 | 5,028 | 19,833 | | 8,826 | 5,713 |

## Total Solvent Used (KL): -- 31,399

| Solvent | Total Qty (KL) | Fresh (KL) | Recovery (KL) | Fresh% | Recovery % |
|---|---|---|---|---|---|
| **Ethyl Acetate** | 10,037 | 4,447 | 5,590 | 44.30% | 55.70% |
| **Methanol** | 5,469 | 5,148 | 321 | 94.12% | 5.88% |
| **Acetone** | 5,393 | 3,746 | 1,647 | 69.46% | 30.54% |
| **DCM** | 3,904 | 2,898 | 1,006 | 74.23% | 25.77% |
| **Toluene** | 2,822 | 1,193 | 1,629 | 42.28% | 57.72% |
| **IPA** | 1,607 | 1,413 | 194 | 87.92% | 12.08% |
| **Contribution** | **29,231** | | | **93.1%** | |

## Major Increase in Output's

- **Methanol**:-- 53 Kl to 125 KL
- **IPA**:-- 53 KL to 93 KL
- **DCM:**-- 124 KL to 151 KL

### Labs-1 Process Output - FY 2025-26(Apr'25-Feb'26)

| Description | Density | April | May | June | July | Aug | Sep | Oct | Nov | Dec | Jan | Feb | Total in MT |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Methanol | 0.792 | 26 | 32 | 55 | 64 | 56 | 43 | 75 | 72 | 98 | 157 | 121 | 632 |
| Ethylene Dichloride | 1.253 | | | | | | | | | | | | - |
| Toluene | 0.862 | 110 | 53 | 61 | 96 | 139 | 207 | 229 | 93 | 139 | 246 | 162 | 1,324 |
| Acetone | 0.785 | 50 | 36 | 82 | 212 | 30 | 82 | 73 | 67 | 86 | 86 | 85 | 697 |
| ISOPROPYL ALCOHOL (IPA) | 0.786 | 85 | 11 | | 45 | 60 | 69 | 40 | 93 | 69 | 94 | 114 | 534 |
| Methylene Chloride | 1.326 | 91 | 1 | | 113 | 113 | 147 | 160 | 98 | 151 | 197 | 147 | 1,613 |
| Ethyl Acetate | 0.902 | 285 | 209 | 261 | 479 | 311 | 484 | 440 | 308 | 455 | 778 | 494 | 4,064 |
| Tetra Hydro Furan | 0.888 | 9 | | 3 | 15 | 18 | 14 | 9 | 6 | 17 | 16 | 7 | 101 |
| N-Heptane | 0.680 | 3 | 2 | 2 | 4 | 3 | 4 | 6 | 8 | 14 | 14 | 12 | 49 |
| Methyl Tertiary Butyl Ether | 0.740 | 7 | 7 | 9 | 12 | 9 | 16 | 25 | 35 | 47 | 41 | 40 | 184 |
| Cyclo Hexane | 0.774 | 4 | 4 | 9 | 24 | 17 | 11 | 27 | 23 | 24 | 45 | 37 | 174 |
| Iso Propyl Acetate | 0.870 | 2 | 5 | 5 | 13 | | 11 | 13 | 11 | 13 | 18 | 13 | 90 |
| Distilled Mixed Solvent | 0.870 | 89 | 8 | 64 | 99 | 214 | 218 | 206 | 231 | 302 | 292 | 294 | 1,754 |
| Mixed CFML's Solvents | | 705 | 668 | 734 | 451 | 459 | 574 | 350 | 311 | 489 | 177 | 45 | - |
| **Total** | | 1469 | 1038 | 1288 | 1632 | 1433 | 1890 | 1660 | 1365 | 1911 | 2170 | 1576 | 11,272 |